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Valipora minuta (Coil, 1950) (Cyclophyllidea: Gryporhynchidae) in *Butorides striata* (Linnaeus, 1758) (Aves: Ardeidae): The first record from Brazil and a new definitive host record

Hudson Alves Pinto, Vítor Luis Tenório Mati and Alan Lane de Melo*

1 Universidade Federal de Minas Gerais, Instituto de Ciências Biológicas, Departamento de Parasitologia. Laboratório de Taxonomia e Biologia de Invertebrados, CP 486, CEP 30123-970. Belo Horizonte, MG, Brazil.
* Corresponding author. E-mail: *aldemelo@icb.ufmg.br*

ABSTRACT: The gryporhynchid tapeworm *Valipora minuta* (Coil, 1950) found in *Butorides striata* (Linnaeus, 1758) from Pampulha dam, Belo Horizonte, Minas Gerais, Brazil, which represents a new definitive host, is reported from South America for the first time. The morphology of the cestodes found is briefly described and compared with previous reports and closely related species.

Valipora Linton, 1927 are intestinal tapeworms of birds, mainly herons (Ardeidae), with a cosmopolitan distribution; the genus includes about 15 described species (Baer and Bona 1960; Schmidt 1986; Bona 1994). The life cycle of these cestodes involves fish as a second intermediate host in which larval forms (metacestodes) develop. After ingestion by fish-eating birds, these worms become adult (Scholz *et al*. 2004).

In Brazil, studies related to larval stages of cestodes in fish are scarce, but adults of four *Valipora* have been reported from ardeid birds: (1) *Valipora unilateralis* (Rudolphi, 1819) described from *Butorides virescens* (Linnaeus, 1758) but considered *nomen delendum* by Baer and Bona (1960); several years later, Rego and Rolas (1972) reported the same cestode in *B. striata* (Linnaeus, 1758) (as *B. virescens*); (2) *V. spinosa* (Fuhrm, 1908) described from *Cochlearius cochlearius* (Linnaeus, 1758); (3) *V. mutabilis* Linton, 1927 described from *Nycticorax nycticorax* (Linnaeus, 1758) in the USA and later found in the same host and *Ardea alba* (Linnaeus, 1758) in Brazil (Pinto *et al*. 2004); and (4) *Valipora* sp. reported from *Pilherodius pileatus* Boddaert, 1783 (Arruda *et al*. 2001).

Unidentified metacestodes of *Valipora* were found in *Prochilodus argenteus* Spix and Agassiz, 1829 by Monteiro *et al*. (2009) and metacestodes of *V. campylancristrota* (Wedl, 1855) were found in another characiform fish *Prochilodus lineatus* (Valenciennes, 1836) and catfishes *Pimelodus maculatus* Lacépède, 1803 and *Hoplosternum littorale* (Hancock, 1828) (Rego *et al*. 1999; Lizama *et al*. 2005; Takemoto *et al*. 2009). Adults of these species have not yet been found in Brazil.

In the present study, a young specimen of *B. striata* was found dead during a malacological survey conducted at Pampulha dam (43°59”35” W, 19°50’50” S) in 25 May 2010. The good state of preservation of the specimen indicated its recent death. It was transported to the laboratory, then identified according to Hayes (2002), and necropsied (authorization number 21590 from the Brazilian Institute of Environment and Renewable Natural Resources – IBAMA).

Viscera were separated in Petri dishes containing saline (0.85% NaCl) and examined with aid of a stereomicroscope. Among the helminth species found, cestodes were found in the small intestine. They were fixed in formalin at 70° C, without compression, stained with alum aceto-carmine, dehydrated in ascending series of alcohols, cleared in beechwood creosote and mounted as permanent slides in Canada balsam. In order to study the rostellar hooks, scoleces of two specimens were squashed and the hooks were mounted in non-permanent preparations after addition of lactophenol. Morphological analysis was carried out on light microscope Leica ICC50 HD with image capture system. Images obtained were analyzed with the software Leica Application Suite (EZ LAZ) version 2.0. The parasite identification was based on the morphology of rostellar hooks and proglottids, according different authors (Coil 1950; Khalil *et al.* 1994; Scholz *et al*. 2002). The specimens studied were deposited in the collection of the Laboratory of Taxonomy and Biology of Invertebrates, at the Department of Parasitology, Universidade Federal de Minas Gerais (DPIC).

The cestodes found were identified as *Valipora minuta* (Coil, 1950) Baer and Bona, 1960 (Figures 1-4, Table 1).

Synonym: *Ophiovalipora minuta* Coil, 1950.

***Host*:** Striated Heron, *Butorides striata* (new host).

***Locality*:** Pampulha dam, Belo Horizonte, Minas Gerais, Brazil (new locality).

***Local of infection*:** Small intestine.

***Material studied*:** 7 specimens deposited (DPIC 6232a-c).

***Other host and localities reported*:** Green heron, *B. virescens* (host type); Indiana, USA (Coil, 1950), Veracruz, Mexico (Ortega-Olivares *et al*. 2008). Metacestodes: *Chirostoma jordani* Woolman, 1894; *Gambusia affinis*

(Baird and Girard, 1853); *Micropterus punctatus* (Rafinesque 1819); *Micropterus salmoides* (Lacepède, 1802); *Poecilia gracilis* Valenciennes in Cuvier and Valenciennes, 1846; *Poecilia sphenops* Valenciennes in Cuvier and Valenciennes, 1846; *Rhamdia guatemalensis* (Günther, 1864); Quintana Roo, Yucatan, Guerrero and Guanajuato, Mexico; Arkansas and Texas, USA (Scholz and Salgado-Maldonado 2001; Scholz *et al*. 2004; Salgado-Maldonado, 2006; Lira-Guerrero *et al*. 2008).

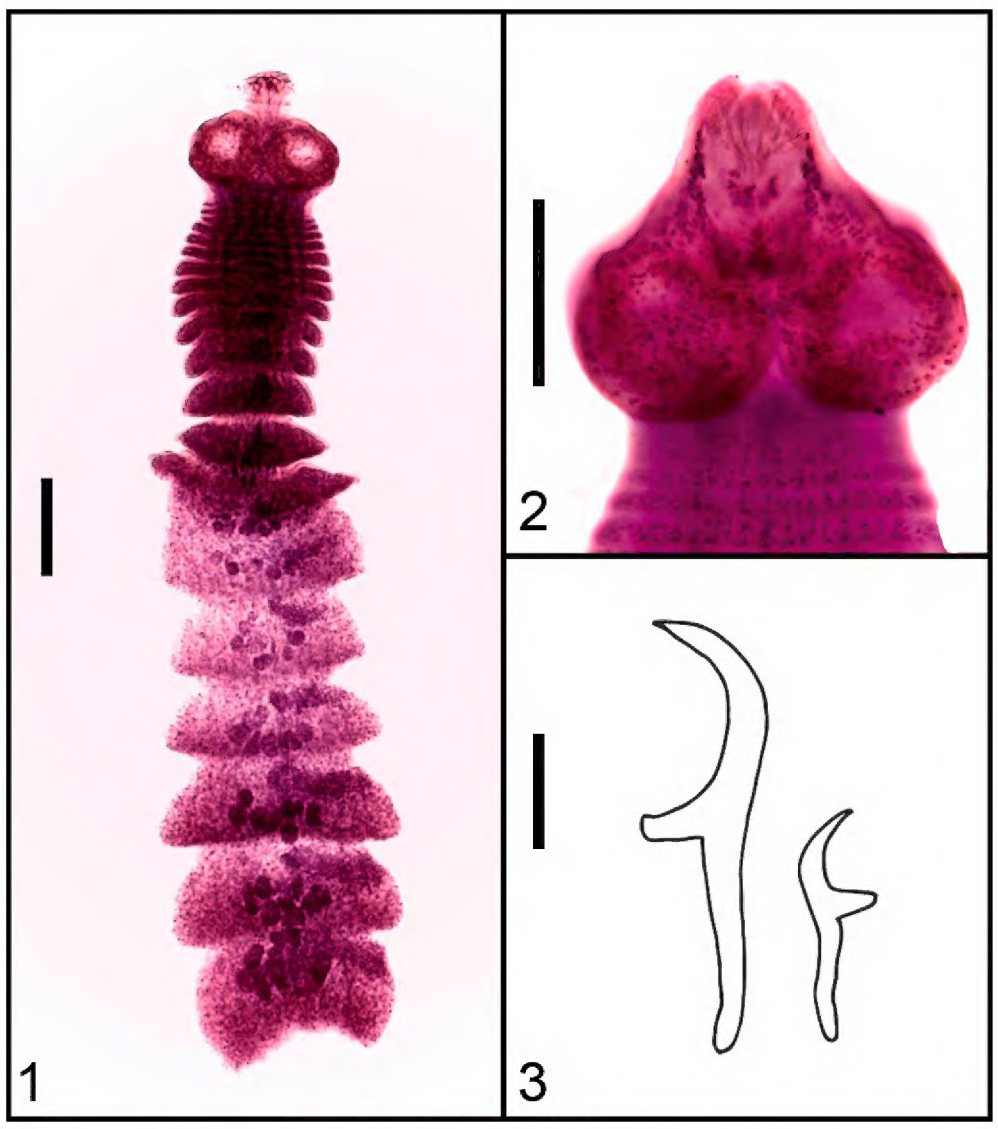

Figure 1-3. *Valipora minuta* (Coil, 1950). 1. Parasite recovered in *Butorides striata* (Linnaeus, 1758) from Belo Horizonte, Minas Gerais, Brazil. 2. Detail of scolex. 3. Line drawing of the distal (left) and proximal (right) rostellar hooks. Scale bar: 1 and 2= 100 µm, 3 = 10 µm.

A comparison of the measurements of rostellar hooks of the parasites obtained in the present study with those of other species of *Valipora* reported to South America is summarized in Table 1.

Valipora minuta differs from other species of the genus mainly by the larger size and shape of the rostellar hooks. In addition, other general morphological features of scolex (number, measures and shape of the rostellar hooks) and proglottids (number of testes, disposition of the cirrus pouch and reproductive structures) are in agreement with the original description of the species by Coil (1950). Furthermore, specimens of *V. minuta* reported in the present study differ from *V. unilateralis* sensu Rego and Rolas (1972) in the position of the cirrus pouch which extends to the middle portion of the proglottid, the number of rostellar hooks (20 in a double row), and the shape of distal hooks which are more straight.

Butorides striata is widely distributed in South America (Hayes 2002). Several studies on its helminth fauna have been carried out in Brazil and more than 20 species of helminths were found (Travassos 1926; Travassos *et al*. 1969; Rego and Rolas 1972; Vicente *et al*. 1995; Arruda *et al*. 2001; Muniz-Pereira *et al*. 2004; Pinto *et al*. 2004). However, *V. minuta* has not been reported from this host, which indicates that it is an uncommon parasite of this heron in South America.

The record of *V. minuta* in South America considerably increases its distribution area, because previous records were limited to North America (USA and Mexico).

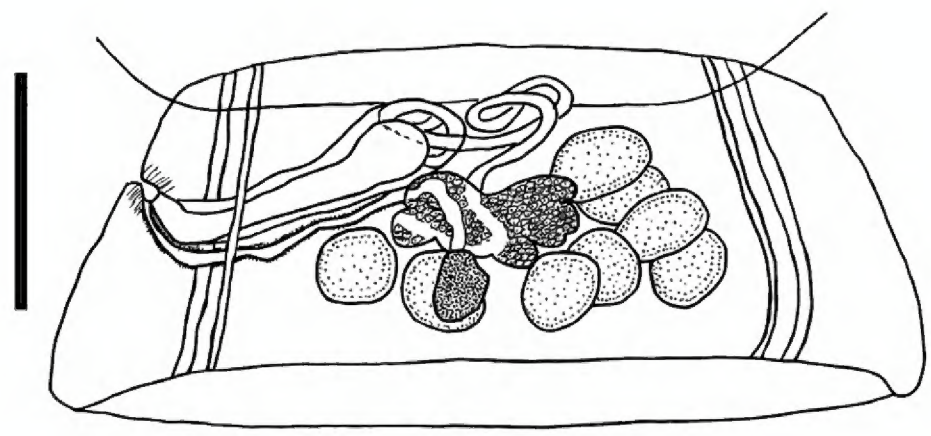

Figure 4. *Valipora minuta* (Coil, 1950). Line drawing of a mature proglottid from parasite recovered in *Butorides striata* (Linnaeus, 1758) from Belo Horizonte, Minas Gerais, Brazil. Scale bar: 100 µm.

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Table 1. Comparative data on measurements (in micrometers) of rostellar hooks of three species of *Valipora* Linton, 1927 reported from Ardeidae in the Americas. Measurements in micrometers. NA = not available.

	Valipora minuta			***Valipora mutabilis***		***Valipora campylancristrota***
Reference	Present study	Coil (1950)	Ortega-Olivares *et al.* (2008)	Scholz *et al.* (2002)	Ortega-Olivares *et al.* (2008)	Ortega-Olivares *et al.* (2008)
Locality	Brazil	USA	Mexico	Mexico	Mexico	Mexico
Host	*Butorides striata*	*B. virescens*	*B. virescens*	*Nycticorax nycticorax*	*B. virescens*	*Ardea alba*
Distal hook						
Length	40 (37-43)	35-40	37-40.5	29 (27-31)	28-31	24-27
Blade	17 (16-20)	ND	16.5-18.5	13 (11-15)	12-14	9-11
Handle	23 (20-25)	ND	22-24	17 (15-19)	14-17	13.5-17
B/H ratio	0.76 (0.65-0.88)	ND	0.70-0.81	0.6-0.8	0.70-0.83	0.50-0.73
Proximal hook						
Length	21 (20-23)	17-20	18-24	11.5 (11-14)	12-14	11-12
Blade	9 (8-9)	ND	6-9	5.5 (4-6)	4-5	4-5
Handle	13 (12-14)	ND	14.5-16	9 (6.5-11)	8-9.5	9-11
B/H ratio	0.64 (0.54-0.75)	ND	0.49-0.55	0.5-0.8	0.40-0.57	0.44-0.55

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